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Version with markings to show changes. (Because changes were made only to pages i-iv, 1, and 381, only these pages are included below.)

ELECTRICAL CONTACT STRUCTURES FORMED BY CONFIGURING A FLEXIBLE WIRE TO HAVE A SPRINGABLE SHAPE AND OVERCOATING THE WIRE WITH AT LEAST ONE LAYER OF A RESILIENT CONDUCTIVE MATERIAL, METHODS OF MOUNTING THE CONTACT STRUCTURES TO ELECTRONIC COMPONENTS, AND APPLICATIONS FOR EMPLOYING THE CONTACT STRUCTURES

OUTLINE

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TITLE

ELECTRICAL CONTACT STRUCTURES FORMED BY CONFIGURING A FLEXIBLE WIRE TO HAVE A SPRINGABLE SHAPE AND OVERCOATING THE WIRE WITH AT LEAST ONE LAYER OF A RESILIENT CONDUCTIVE MATERIAL, METHODS OF MOUNTING THE CONTACT STRUCTURES TO ELECTRONIC COMPONENTS, AND APPLICATIONS FOR EMPLOYING THE CONTACT STRUCTURES

TECHNICAL FIELD OF THE INVENTION

[0001] The invention relates to contact structures for making electrical connections to, from and between electronic components, especially microelectronic components and, more particularly, to contact structures exhibiting resiliency and/or compliance.

ABSTRACT

Contact structures exhibiting resilience or compliance for a variety of electronic components are formed by bonding a free end of a wire to a substrate, configuring the wire into a wire stem having a springable shape, severing the wire stem, and overcoating the wire stem with at least one layer of a material chosen primarily for its structural (resiliency, compliance) characteristics. [A variety of techniques for configuring, severing, and overcoating the wire stem are disclosed. In an exemplary embodiment, a free end of a wire stem is bonded to a contact area on a substrate, the wire stem is configured to have a springable shape, the wire stem is severed to be free-standing by an electrical discharge, and the free-standing wire stem is overcoated by plating. A variety of materials for the wire stem (which serves as a falsework) and for the overcoat (which serves as a superstructure over the falsework) are disclosed. Various techniques are described for mounting the contact structures to a variety of electronic components (e.g., semiconductor wafers and dies, semiconductor packages, interposers, interconnect substrates, etc.), and various process sequences are described. The resilient contact structures described herein are ideal for making a "temporary" (probe) connections to an electronic component such as a semiconductor die, for burn-in and functional testing. The self-same resilient contact structures can be used for subsequent permanent mounting of the electronic component, such as by soldering to a printed circuit board (PCB). An irregular topography can be created on or imparted to the tip of the contact structure to enhance its ability to interconnect resiliently with another electronic component. Among the numerous advantages of the present invention is the great facility with which the tips of a plurality of contact structures can be made to be coplanar with one another. Other techniques and embodiments, such as wherein the falsework wirestem protrudes beyond an end of the superstructure, or is melted down, and wherein multiple free-standing resilient contact structures can be fabricated from loops, are described.]

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